

**Department of Energy**  
Nevada Operations Office  
P. O. Box 98518  
Las Vegas, NV 89193-8518

October 21, 1988

see L-66a  
L-66b  
L-66c

H. I. Kohn, BARC, Berkeley, CA  
Samuel Thomsen, Representative to the Marshall Islands,  
Majuro, MI  
J. E. Rudolph, MA, HQ (DP-242) GTN  
N. C. Aquilina, MGR, NV  
D. T. Schueler, OER, NV  
J. H. Dryden, PASO

TRIP REPORT - DOE/RMI MEETING ON RADIOLOGICAL RELATED PROGRAM  
REQUIREMENTS IN THE MARSHALL ISLANDS FY 1989 AND BEYOND -  
SEPTEMBER 23, 1988, HONOLULU, HAWAII

- I. Attendees and Agenda (Attachment A)
- II. Summary

The meeting was structured to provide the RMI with an overview of the DOE funded FY 89 program and to recommend relevant environmental and radiological safety monitoring work in FY 1990 and beyond. A specific goal was to reach a consensus on how the agreed upon programs should be funded after FY 89.

A presentation was made covering DOE's plans to focus the plutonium dose issue. This does not alter DOE's position, reinforced by Dr. Kohn's Rongelap Reassessment Report and past dosimetry reviews, that plutonium is a minor contributor to dose in the Marshall Islands context. The presentation also included plans for continuation of several LLNL environmental/dose projects, as well as for whole-body counting and bioassay work both for baseline information and for safety assurances, for returning populations.

A proposal was set forth for FY 1990-1991 whereby DOE would fund about \$3 million of program costs and RMI \$2 million. It was noted that DOE would continue to receive outside review of programs for scientific validity, focused relevance and cost efficiency. RMI will give DOE an official response by about Oct 10, however,

John Rudolph's files  
letter files  
letters- Marshall Islands 1988

the Chief Secretary indicated that since \$2 million of the 177 money was mandated by Congress to be spent on a separate health care program, and since RMI was a poor country, that there was no real probability that RMI would fund \$2 million, or anything. They indicated RMI might go to Congress to seek the \$2 million.

The Marshall Islands Claims Tribunal representative was advised that any requests to DOE for technical advice or other assistance must be formally channeled through RMI to the U.S. Department of State. No direct contact to our National Laboratories will be acted upon. We will cooperate fully through established government-to-government channels. The Tribunal will be expected to fund any work we agree to undertake on behalf of RMI.

III. Presentation of Program Recommendations

BNL - Attachment B (Includes Pu Program)

LLNL - Attachment C

IV. FY 89 DOE Cost Estimate and FY 90/91 Cost Sharing Proposal (Attachment D)

V. Questions Posed and Issues Raised                      Response

- |   |  |
|---|--|
| 1. The representative from Uterik raised the question of "all the thyroid problems on Uterik" and questioned Dr. Kohn's statement that diabetes is prevalent in the Marshalls but is not clinically associated with radiation exposure. | Both DOE and the special 177 Health Program are monitoring and treating the Uterik people. |
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2. The Counsel for Enewetak asked when the Enjebi dose assessment would be translated and presented in the Marshalls.

Harry Brown stated that an English summary was drafted and the target for translation and conveying to RMI is January 89.
3. RMI agreed with the basic U.S. program presentation, but may wish to give it a different emphasis. They want the work to be practical and contribute directly to resettlement.

DOE suggested they communicate any specifics in writing.
4. Dr. Kohn wants LLNL to publish what they previously committed to.

Since a specific topic(s) could not be identified, DOE suggested Dr. Kohn communicate specifics in writing.
5. The question of infant diet was raised.

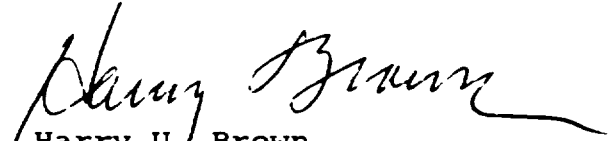
This was acknowledged as a task Dr. Kohn has undertaken.
6. The RMI Claims Tribunal has received claims from people living in the Southern Marshalls and are seeking radiological information for the Southern Marshalls. They are also looking for information on radiation and health effects.

They were advised to ask their questions through government-to-government channels. Also, we suggested that they assemble a non U.S. Government headed group of radiation health experts to provide advice. DOE will be willing to send a representative. We suggested that technical advice might be better received if it comes from an internationally competent source other than DOE.

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|---|---|
| 7. Part of DOE's cost sharing proposal involved joint funding (\$50K each) of a radiation education program, which could be instituted at the junior/senior high school level, could be used for MI college financial aid, and for programs at the community level. | All agreed this was a good concept and probably should be run by an organization other than DOE; but DOE would participate as appropriate.                              |
| 8. RMI asked that DOE provide them specific advice on mitigation recommendations both as to where and how.  | Harry Brown pointed out that RMI had received specific advice for Enyu and general advice for Enewetak Atoll. DOE will consolidate this information and give it to RMI. |
| 9. Where will the whole-body counting/bioassay be conducted.  | Enewetak, Ujulang, Ejit, Mejatto, and Uterik.   |
| 10. Peter Oliver questioned whether further scientific work is required at Uterik.  | Both Dr. Kohn and Dr. Robison indicated there was no health or technical reason to do so.   |

John Rudolph proposed another meeting in about 6 months to review outstanding issues and potential program impacts in FY 1990 if funding issues have not been resolved.

  
Harry U. Brown  
Deputy Program Manager  
Office of Emergency Response  
and Program Analysis

Enclosures:  
As stated

Brookhaven National Laboratory

Marshall  
Islands  
Radiological  
Safety  
Program

# OUR GOAL

## Health & Safety dri-Marshall

- Improve Database System
- Update Plutonium Intake
- Project Cesium Dose
- Assist Radiological Education  
for Islanders

# Short Term Objectives

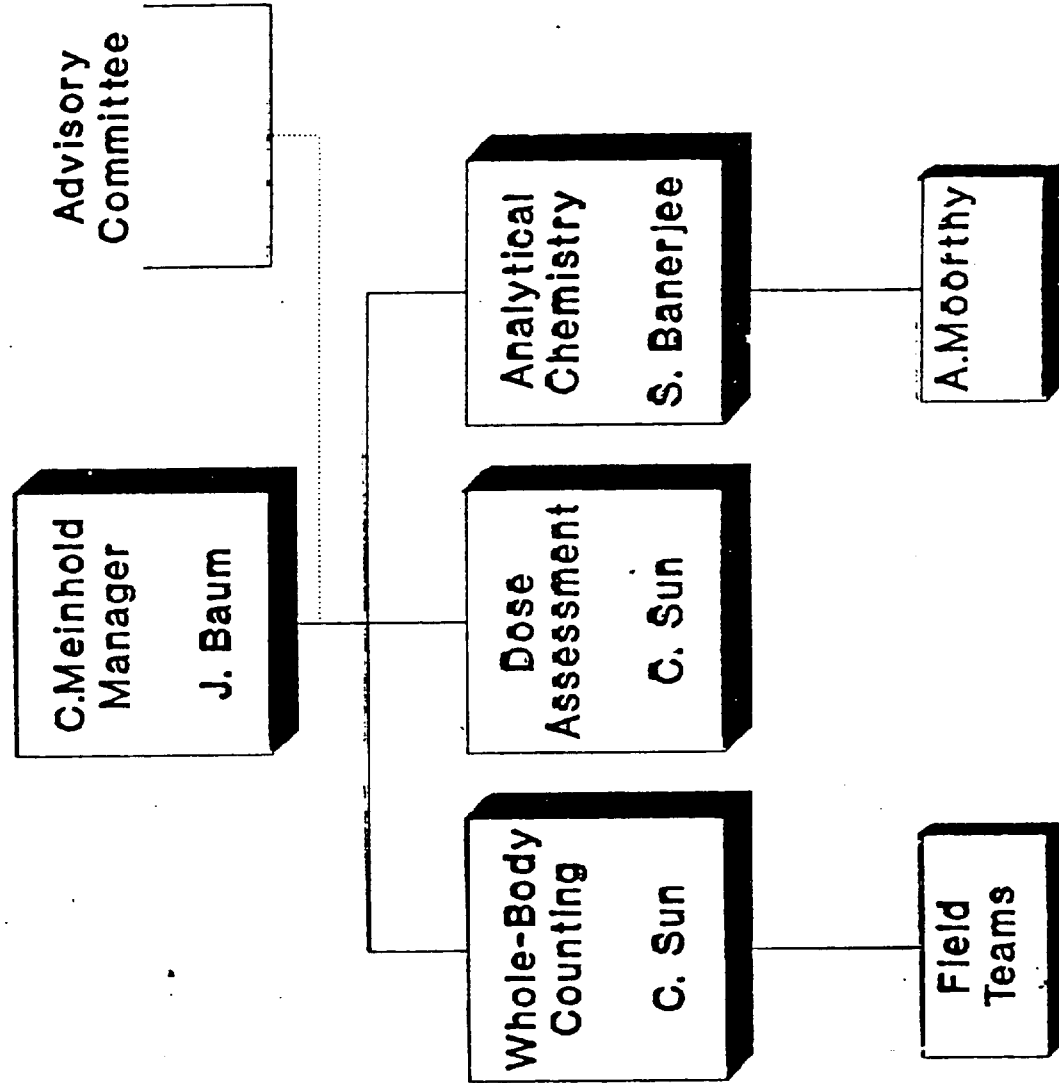
- Summarize Previous Results
- Conduct Whole-Body Counting and Collect Urine and Feces Samples
- Eliminate Contamination in Urine Samples
- Institute Pu Analysis Program with Other Laboratory

## PLUTONIUM DOSE

1. RE-EXAMINE ALL RAW DATA AND RECALCULATE COMMITTED EFFECTIVE DOSE EQUIVALENT.
2. CONDUCT WHOLE-BODY PROGRAM AND BIOASSAY BEFORE AND AFTER - ENEWETAK, MEJATTO, KILI, UTRIK.
3. ESTABLISH NON-EXPOSED PU BACKGROUND; INVESTIGATE SAMPLE CONTAMINATION.
4. NEW DETECTORS AND WBC EQUIPMENT PURCHASED.
5. ESTABLISH A PROTOCOL TO COLLECT SAMPLES.
6. FURTHER ANALYZE SOIL AND WATER FOR PU.
7. DEVELOP FECAL EXCRETION MODEL.
8. INSTITUTE A PU ANALYSIS PROGRAM WITH ANOTHER LAB.
9. ESTABLISH ADVISORY COMMITTEE OF NATIONALLY RESPECTED SCIENTISTS AND PHYSICIANS FOR OVERVIEW.



# MIRS/BNL Organization Chart

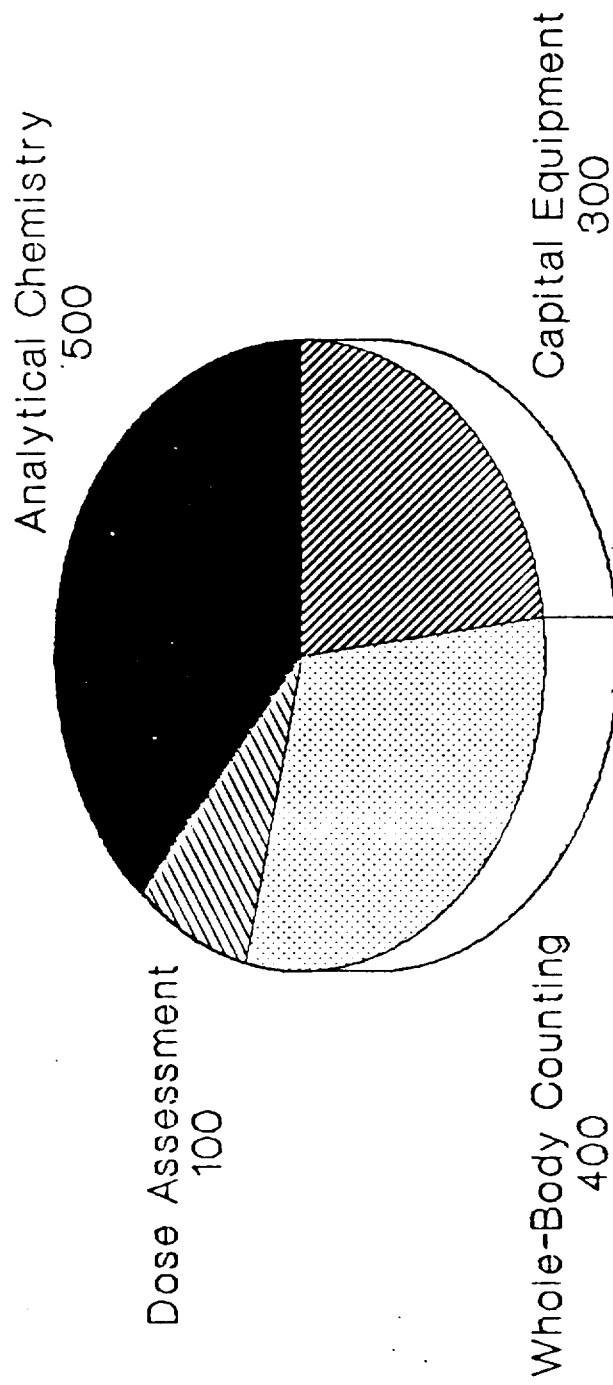


## BNL Experience/Plan

<u>YEAR</u>	<u>Milestones/Landmarks</u>
1957	WBC initiated
1974	dri-Bikini Repatriated
1978	S&EP/dri-Bikini to Kili
1980	dri-Enewetak Rehabilitation
1981	RUDR Program
1985	dri-Rongelap to Majatto
1986	Fission Track Pu Analysis
1988	Fecal Sampling Program
1989	WBC & Bioassay

# MIRS/BNL PLAN, 1989

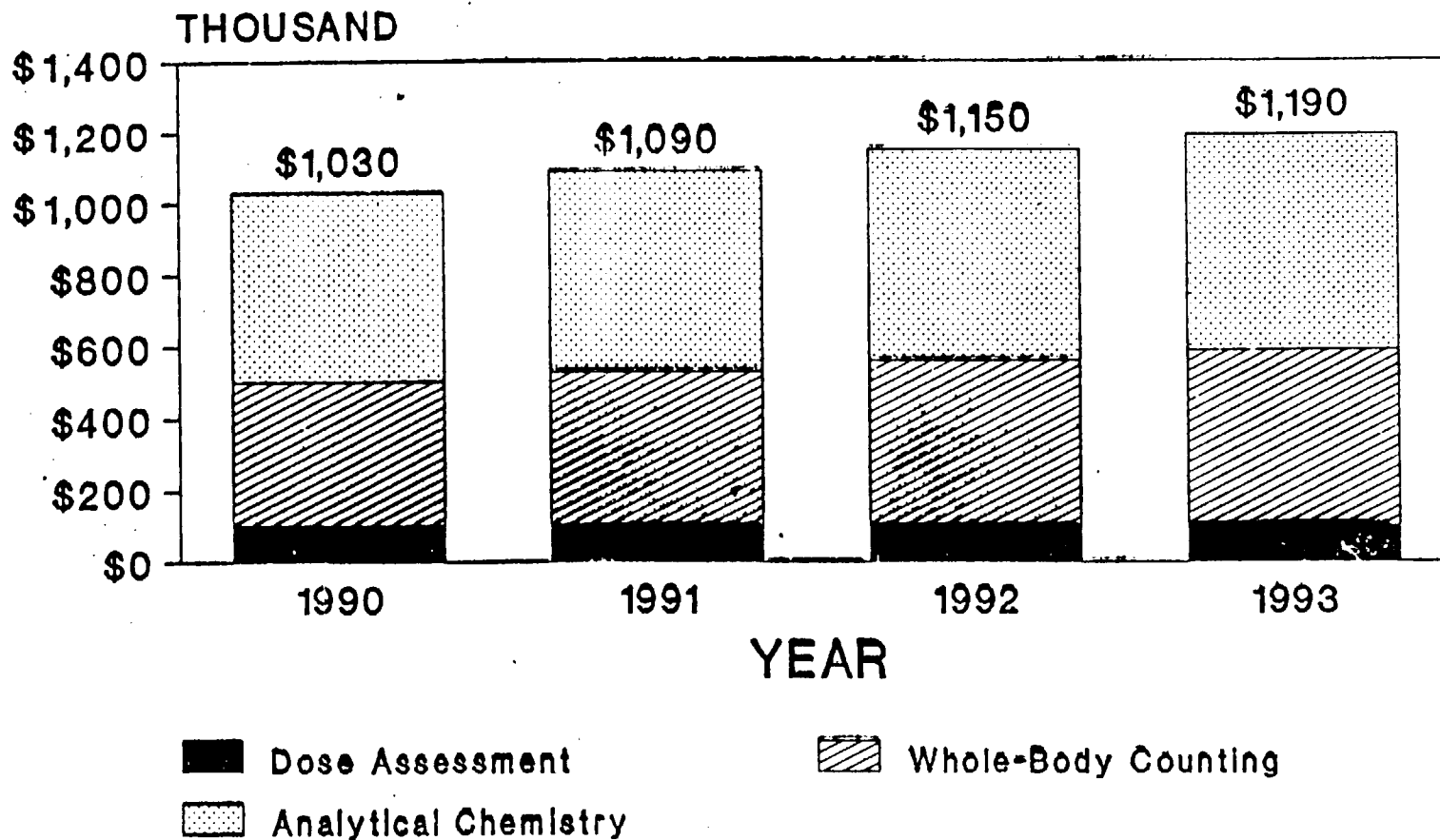
## Total Operational Cost \$1.3 Million



Unit In \$1,000

# M.I.R.S.

## Estimated Costs (1990-1993)



LLNL Marshall Islands Program  
FY 1989 - Bikini Atoll

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1. Updated dose assessment for Eneu Island
2. Retrospective dose assessment
3. Field experiments

A. Experiments to continue in FY 1989; Eneu Island follow-up

1. High K - Bikini/Eneu
2. N,P,K - Bikini
3. Super K - Bikini
4. WR Super K - Bikini
5. CLC Low K - Bikini
6. Breadfruit High K - Bikini
7. Permanent coconut trees (Env. T 1/2) - Bikini/Eneu
8. Cropping - Bikini

## LLNL Marshall Islands Program - Bikini Atoll



### A. Experiments to continue through FY 1993

1. High K - Bikini/Eneu ; *Eneu Island follow-up*
2. N,P,K - Bikini
3. Super K - Bikini
4. WR Super K - Bikini
5. CLC Low K - Bikini
6. Breadfruit High K - Bikini
7. Permanent coconut trees (Env. T 1/2) - Bikini/Eneu
8. Cropping - Bikini
9. Phase I irrigation - Bikini
10. Phase II irrigation - Bikini
11. Data base for dose assessment - Bikini/Eneu
12.  $^{137}\text{Cs}$  uptake as a function of  $^{137}\text{Cs}$  distribution in the soil column

# **LLNL Marshall Islands Program - Bikini Atoll**

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## **B. Experiments to be terminated**

- 1. New K-rate**
- 2. CEE**
- 3. Zeolite**
- 4. Ion penetration**
- 5. Mass food production**
- 6. Solar sterilization**
- 7. K-combination**
- 8. Na-leaching**
- 9. Papaya rooting study**
- 10. Excavation plot**
- 11. Excavation control plot**
- 12. Miscellaneous**

# **LLNL Marshall Islands Program FY 1989 - Rongelap Atoll**

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- 1. Environmental T 1/2 – Rongelap and Kabelle Islands**
- 2. Updated dose assessment for Rongelap Island**



# **LLNL Marshall Islands Program - Rongelap Atoll**



**Experiments to continue through FY 1993**

- 1. Environmental T 1/2 (Kabelle)**
- 2. Environmental T 1/2 (Rongelap)**
- 3. Coconut variety: difference in  $^{137}\text{Cs}$  uptake (2 y)**
- 4.  $^{137}\text{Cs}$  uptake as a function of  $^{137}\text{Cs}$  distribution in the soil column (2 y)**
- 5. Data base for dose assessment (Rongelap, Kabelle, others)**

## **LLNL Marshall Islands Program FY 1989 - Bikini Atoll (Continued)**



9. Phase I Irrigation - Bikini
10. Phase II irrigation - Bikini
11. Data base for dose assessment - Bikini/Eneu
12.  $^{137}\text{Cs}$  uptake as a function of  $^{137}\text{Cs}$  distribution in the soil column
13. New K-rate
14. CEE
15. Zeolite
16. Solar sterilization
17. K-combination
18. Papaya rooting study
19. Excavation plot
20. Excavation control plot

# **LLNL Marshall Islands Program FY 1989 - Bikini Atoll (Continued)**

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## **B. Experiments to be terminated in FY 1989**

- 1.) Ion penetration
- 2.) Mass food production
- 3.) Na-leaching
- 4.) Miscellaneous

## **4. Laboratory Experiments**

- 1.)  $^{137}\text{Cs}$  Kd
- 2.) Organic moiety
- 3.) Illite component

# **LLNL Marshall Islands Program - Laboratory Studies**



**Experiments to continue from FY 1990 – FY 1992**

- 1.  $^{137}\text{Cs}$  binding –  $K_d$**
- 2. Organic moiety**
- 3. Illite component**
- 4. Satellite telemetry data –  $^{137}\text{Cs}$  cycling model**

## **LLNL Marshall Islands Program - Enewetak Atoll**



**Experiments to continue through FY 1993**

- 1. Enjebi garden**
- 2. High K experiments: coconut, breadfruit, Pandanus**
- 3. Environmental T 1/2 (Belle, Clara, Daisy, Irene, Enjebi)**
- 4. Six northern Islands (Aej, Lujor, Aomon, Bijiere, Ursula, Alembel)**

## **Recommended Actions for the Near Future**



### **Bikini Atoll**

- 1. KCI application on Eneu Island**
- 2. Extended field experiments**
- 3. Updated dose assessment for Eneu Island**

### **Enewetak Atoll**

- 1. KCI applications on 6 northern islands**
- 2. Extended field experiments**
- 3. Monitoring of 6 northern islands**

## **Recommended Actions for the Near Future (Continued)**

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### **Rongelap Atoll**

- 1. KCl applications**
- 2. Environmental T 1/2 sample collections**
- 3. Updated dose assessment for Rongelap Island**

# **LLNL Marshall Islands Program Time-Lines for Research and Monitoring (Continued)**



## **Fiscal Year**

**1989      1990      1991      1992      1993**

**Enewetak**

**Enjebi Garden**

**K-Exps.**

**Env. T 1/2**

**6 Northern Islands**

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**Rongelap**

**Env. T 1/2**

**Northern Is.**

**Rongelap Is. Dose**

**Assessment**

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# LLNL Marshall Islands Program

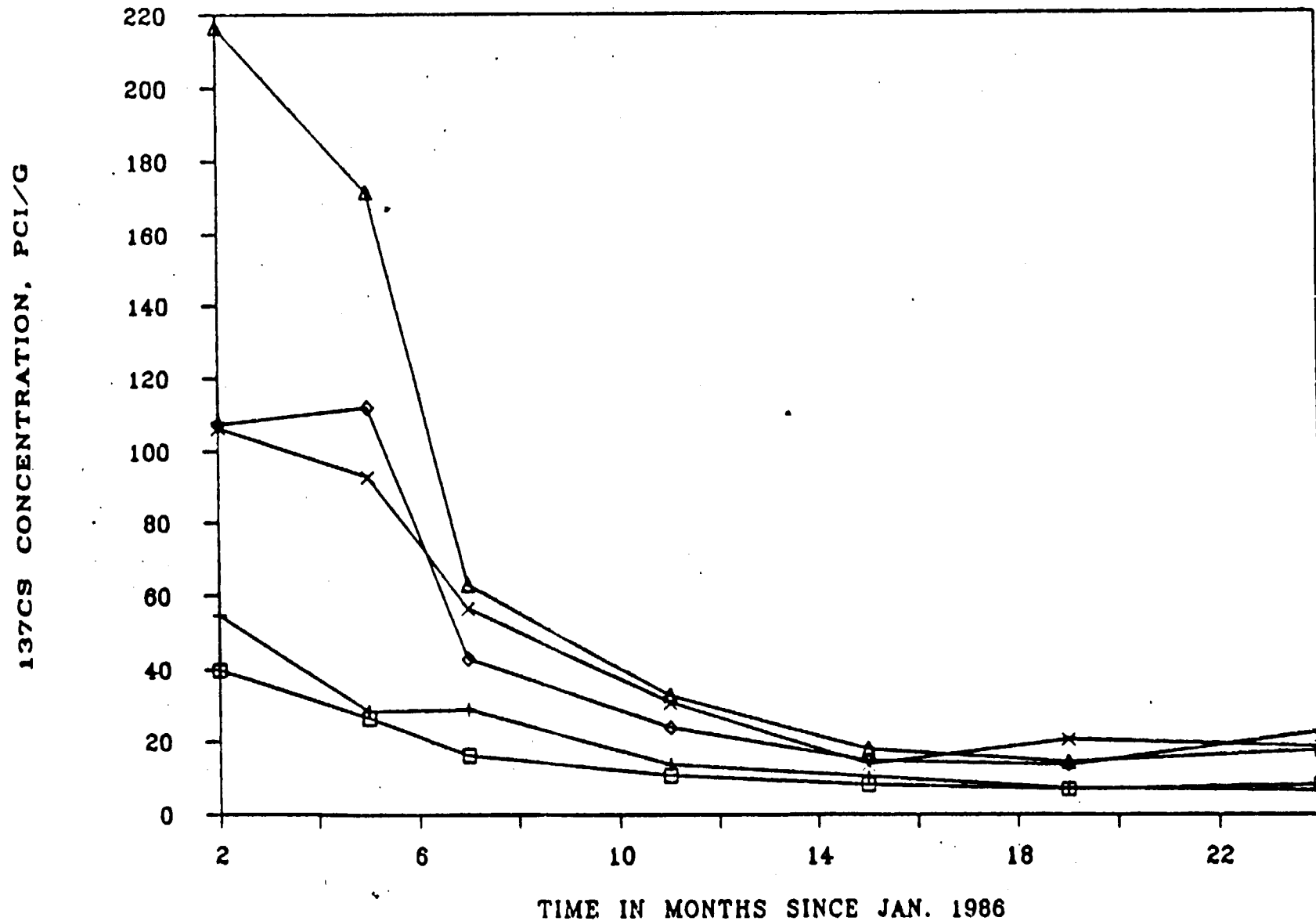
## Time-Lines for Research and Monitoring



	Fiscal Year				
	1989	1990	1991	1992	1993
Bikini					
K-Exps.					
Env. T 1/2					
Cropping					
CEE					
Zeolite					
K-Rate					
Excavation Control					
Excavation					
Phase I Irrig.					
Phase II Irrig.					
Laboratory Exp.					
<sup>137</sup> Cs Binding					
Eneu Is. Dose					
Assessment					
<sup>137</sup> Cs Cycling					
Retrospective Dose					
Assessment					
Miscellaneous					

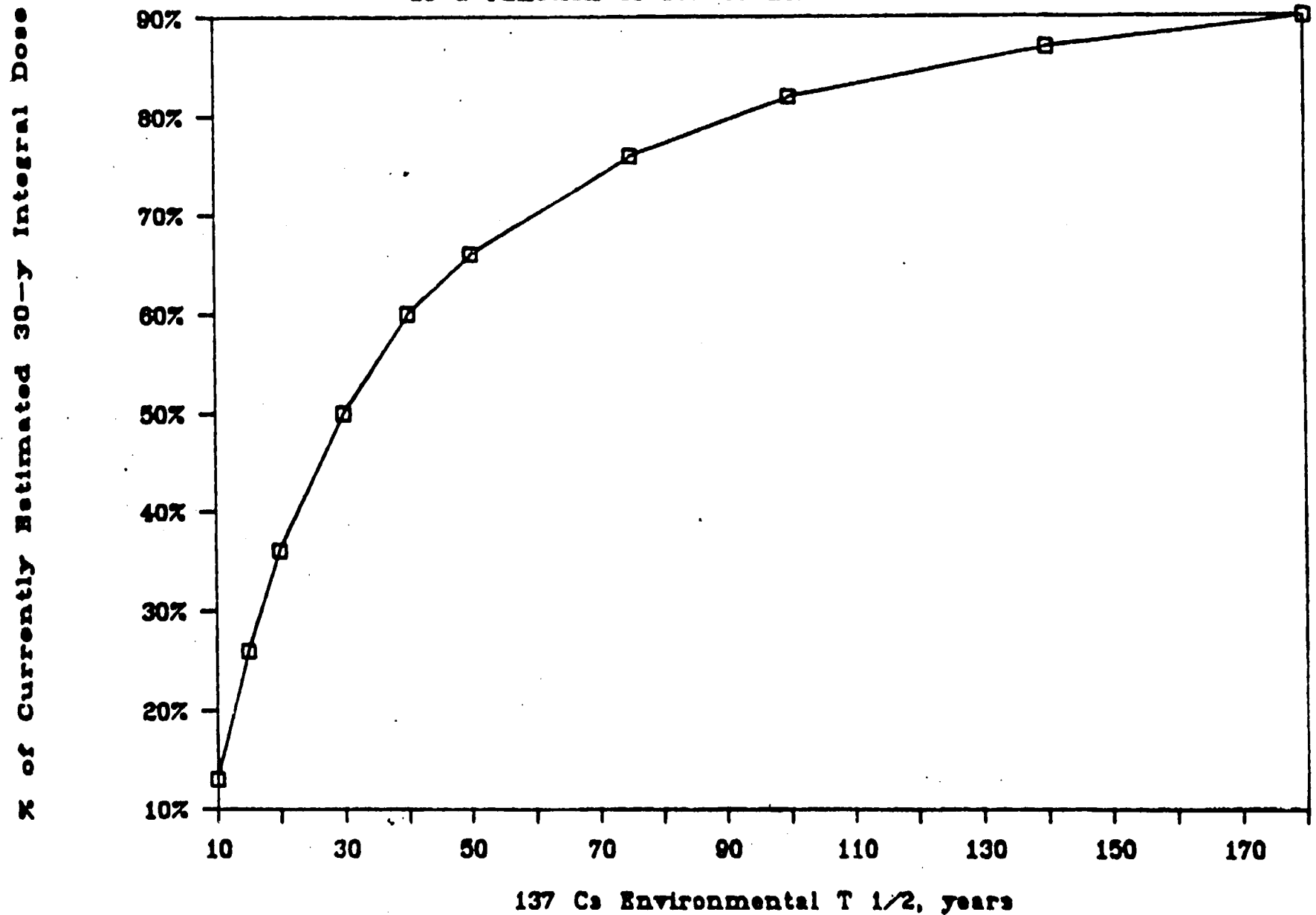
# SUPER-K EXPERIMENT; BIKINI ISLAND

DRINKING COCO MEAT - K TREATMENT



## Reduction in Currently Estimated Dose

as a function of  $^{137}\text{Cs}$  Environmental Half-life



**LLNL Marshall Islands Program**  
**Estimated Manpower and Budget, FY 1990 - FY 1993**

<u>Tasks</u>	<u>FTE</u>	<u>\$K</u>	<u>Sum \$K</u>
All tasks; LLNL Manpower	10.2 <sup>a</sup>	1,317	1,317
Management, Writing, Field	0.9 FTE		
Models, Assessment, Q.A., Contracts	1.5 FTE		
Laboratory and Field	3.0 FTE		
Sample and Data Management	3.0 FTE		
Gamma Spectroscopy Facility	1.6 FTE		
Miscellaneous	0.2 FTE		
Laboratory/Data Management Support (Contract)	3.0 <sup>a</sup>	129	1,446
Consultants	N.A.	20	1,466
Analytical (Wet Chemistry)	N.A.	150	1,616
Field Logistics and Support	N.A.	150	1,766

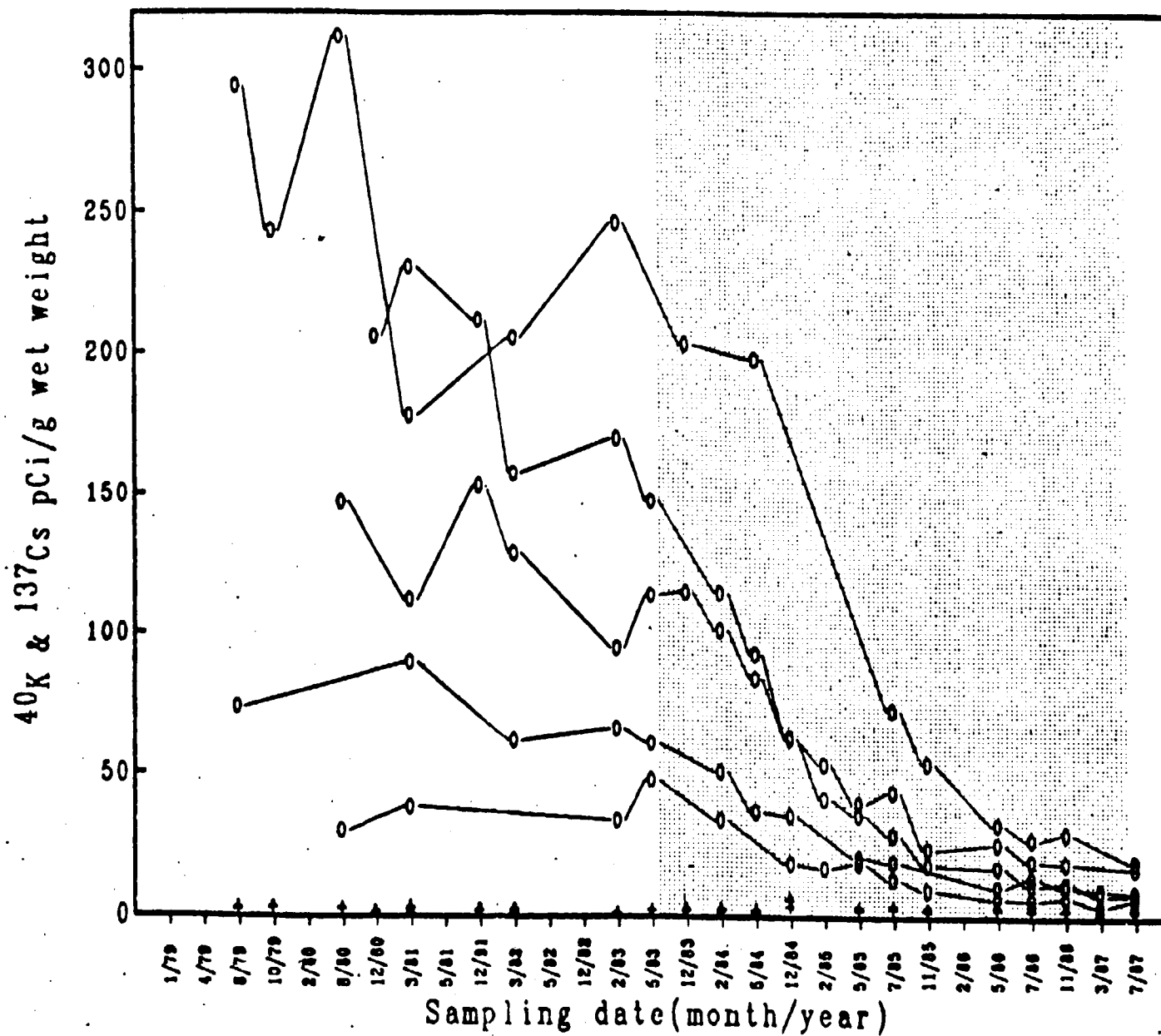
<sup>a</sup> This represents a reduction of 3.0 LLNL FTE and 5 contract FTE for a total reduction of 8 personnel relative to the staff required to conduct the program over the past three years.

The approximate apportionment of the cost among the various atolls is:

Bikini Atoll - \$1,420K  
 Enewetak Atoll - 250K  
 Rongelap Atoll - 100K  
 Total \$1,770

# HIGH K - DRINKING COCO MEAT

Bikini Is.- Trees B-1, B-4, B-9, B-10 & B-13



1  
**LLNL Marshall Islands Program**  
**Estimated Manpower and Budget, FY 1989**

<u>Tasks</u>	<u>FTE</u>	<u>\$K</u>	<u>Sum \$K</u>
All tasks; LLNL Manpower	11.2 <sup>a</sup>	1,397	1,397
Management, Writing, Field	0.9 FTE		
Models, Assessment, Q.A., Contracts	1.5 FTE		
Laboratory and Field	3.5 FTE		
Sample and Data Management	3.5 FTE		
Gamma Spectroscopy Facility	1.6 FTE		
Miscellaneous	0.2 FTE		
Laboratory/Data Management Support (Contract)	5.0 <sup>a</sup>	214	1,611
Consultants	N.A.	20	1,631
Analytical (Wet Chemistry)	N.A.	150	1,781
Field Logistics and Support	N.A.	150	1,931

<sup>a</sup> This represents a reduction of 2.0 LLNL FTE and 3 contract FTE for a total reduction of 5 personnel relative to the staff required to conduct the program over the past three years.

The approximate apportionment of the cost among the various atolls is:

Bikini Atoll -	\$1,580K
Enewetak Atoll -	250K
Rongelap Atoll -	100K
Total	\$1,930

DOE PROGRAM COSTS (ESTIMATED)

FY 1989

(\$000)

*MEDICAL PROGRAM (BNL)	\$ 950
*PLUTONIUM DOSE REVIEW (BNL)	
BNL	400
UNIVERSITY OF UTAH (QA)	100
*WHOLE BODY COUNTING (BNL)	
PROGRAM	575
CAPITAL EQUIPMENT	300
*ENVIRONMENTAL ASSESSMENTS (LLNL)	1,300
CAPITAL	100
*LOGISTICAL SUPPORT (DOE-H&N)	1,500
SHIP	
FIELD STATION BIKINI	
MEDICAL REFERRALS	
PROGRAM	
CAPITAL	

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\$5,225

PROPOSED PROGRAM FUNDING (ESTIMATED)

FY 1990 - 1991

(\$000)---

	U. S.	RMI
MEDICAL	1,200	
WHOLE BODY COUNTING - BIOASSAY	500	500
ENVIRONMENTAL ASSESSMENTS	750	750
LOGISTICAL SUPPORT	700	700
RADIOLOGICAL EDUCATION	<u>25</u>	<u>25</u>
	3,175	1,975